



Leopoldina
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der Wissenschaften

Leopoldina news

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Deutsche Akademie der Naturforscher Leopoldina –
German National Academy of Sciences

Halle (Saale), 6 February 2019



Deutscher Zukunftspreis goes to Helga Rübsamen-Schaeff

INNOVATION POLICY

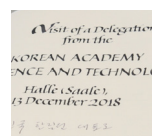
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Editorial

Dear Members and Friends
of the Leopoldina,



2019 is set to be the year of artificial intelligence (AI). The German Federal Ministry of Education and Research is devoting the topic

of its Science Year to this field, and the Research Summit on 19 March invites representatives from scientific, political and economic communities to discuss AI (see article opposite). In addition, the Leopoldina will continue the collaboration initiated in 2018 with the French Académie des Sciences on AI and robotics.

In our role as the National Academy of Sciences, we are keeping an equally watchful eye on other pressing societal issues. To cite but a few: archaeology and how we deal with cultural heritage will take on added importance over the coming months, the Academy's working group on "Biodiversity" is currently preparing a detailed statement, and our experts are due to put forward policy options for the legal framework governing reproductive medicine. Issues and developments in scientific policy and research systems on which the Leopoldina is consulted for independent advice also come into the mix. The months ahead certainly promise to bring a wide variety of tasks!

Importantly, 2019 will also be the occasion of some notable anniversaries, two of which I would like to highlight here. The first is the 70th anniversary of the German constitution being proclaimed as the basis of our peaceful and democratic coexistence under the rule of law on 23 May. The second is the 250th birthday of the natural scientist, polymath and Leopoldina Member Alexander von Humboldt on 14 September, to whom we will pay tribute with two events in Halle and Berlin respectively. I warmly invite you to join our discussions, collaborate on our work and celebrate these anniversaries with us.

Jörg Hacker

Living, researching and working with intelligent machines

2019 Research Summit to discuss key technology



As shown here in 2018, debates at the Research Summit are designed as open forums that give the experts involved a great deal of scope.

Photo: David Ausserhofer

Artificial intelligence (AI) ranks among those research fields that will shape public debate about our future far beyond the walls of scientific institutions. From national strategy papers, policy advice on industry and innovation, statements from stakeholders and essays criticising contemporary culture to science fiction novels: an almost mind-boggling array of voices attempt to answer questions as to how the development and use of AI technologies will change the behaviour and everyday lives of citizens, alter the processes of scientific research and industry innovation, and affect Germany's position in the international marketplace – as well as questions as to how they should do so.

In such complex situations, it is particularly important to facilitate dialogue between a wide variety of different perspectives on AI, perspectives that are based on current scientific understanding, in order to reach viable policy recommendations for our future with intelligent machines. The Leopoldina is primarily working with its "Digital Society" Standing Committee to achieve this.

This year's Research Summit also focuses on AI: on 19 March in Berlin, experts and decision makers from science, industry, politics and civil society will debate this key technology as the engine of innovation for a new generation. The to-

pics will range from analysis of Germany's national AI strategy and Europe's position in the competition for ideas, funding and innovation with the US and China, to the issue of what kind of innovative culture is most likely to generate successful developments in AI.

Leopoldina Members Prof. Dr. Elisabeth André, Prof. Dr. Dietmar Harhoff, Prof. Dr. Klaus-Robert Müller and Prof. Dr. Bernhard Schölkopf will be among those taking part in three roundtable discussions. President of the Leopoldina, Prof. Dr. Jörg Hacker ML, will summarise the Summit's major findings in his closing speech.

The Research Summit – which is supported by the Volkswagen Foundation – has been organised annually since 2015 by the Leopoldina in cooperation with the Donors' Association for the Promotion of Humanities and Sciences in Germany (Stifterverband) and the Commission of Experts for Research and Innovation (EFI). The meeting has established itself as one of the most important national forums for innovation policy debate and networking. Once again, it will be possible to follow this year's event via the Livestream platform.

(art)

LEOPOLDINA STANDING COMMITTEE
DIGITAL SOCIETY

2019 RESEARCH SUMMIT (GERMAN ONLY)

Life-saving active substance for bone marrow recipients

Leopoldina Member Helga Rübsamen-Schaeff receives 2018 Deutscher Zukunftspreis

The Deutscher Zukunftspreis, the Federal President's Award for Innovation in Science and Technology, is one of the highest ranking research awards here in Germany. In 2018, another member of the Leopoldina became the latest recipient of the prize: chemist Prof. Dr. Helga Rübsamen-Schaeff.

Professor Rübsamen-Schaeff, in November you and Dr. Holger Zimmermann jointly received the Deutscher Zukunftspreis for Innovation in Science and Technology, which is endowed with 250,000 euros, for developing letermovir, a drug that inhibits the human cytomegalovirus. What does the inhibitor do?

Helga Rübsamen-Schaeff: The cytomegalovirus is widespread, one in two Germans carry it. As long as the immune system is healthy, people don't usually notice it though. If there is no longer any immune protection, however, such as after a bone marrow transplant, the deadly virus can erupt. If it does, a person's own bone marrow is destroyed. Prophylactic treatment is therefore needed until the donor bone marrow has taken root and new immune protection has developed. Otherwise this can lead to acute rejection responses, organ damage or even death in transplant patients.

What makes the substance you have developed so special?

Rübsamen-Schaeff: We developed a small chemical molecule as the active substance which attacks a particular gene in the virus, its Achilles heel so to speak. This gene codes the terminase, the enzyme that is needed for the virus to mould its genetic makeup to the correct shape so that it can squeeze it into a new, infectious virus particle. Humans do not have this type of enzyme. That means that we can use a high dose of the drug, since the findings to date show that it is well tolerated by humans. Previous products had serious adverse effects, and therefore couldn't be used preventatively.

In order to develop the drug, you left Bayer in 2006 and founded the biotech firm AiCuris. How high was the risk?

Rübsamen-Schaeff: At that time, Bayer



Samples of viral pathogens that could attack a weakened immune system following a bone marrow transplant are stored at minus 140 degrees Celsius.

Photo: Ansgar Pudenz

was willing to put the patents and the 13 projects from our drug development research at my disposal for the new company in return for a share of the revenue, but they made it clear that I had to finance it. There is a statistic in pharmaceuticals that says you have to test ten substances on humans for the first time before a drug will reach the market. Statistically speaking, I had to take all the projects with me to be in with a realistic chance of at least one finding its way to the market. This meant I needed a double-digit million sum per year, for several years.

How did you finance it?

Rübsamen-Schaeff: There was no public funding, and venture capitalists do not normally invest on this scale, especially not over such long periods. It was therefore extremely lucky that the brothers Andreas and Thomas Strüngmann, who at the time had just sold Hexal AG, came on board at AiCuris.

You are familiar with the worlds of research in both university and industrial settings. What are the main similarities and differences?

Rübsamen-Schaeff: The main thing

HELGA RÜBSAMEN-SCHAEFF



... born in 1949, studied and gained a PhD in chemistry, completed her postdoctoral qualification (Habilitation) in 1983 at the University of Frankfurt (Main). Between 1982 and 1986, she headed the Department for Immunotherapy at the Georg-Speyer-Haus research institute, in 1987 became director of the institute, and from 1988 onwards was a professor of biochemistry and virology at the University of Frankfurt (Main). In 1994 she moved to Bayer AG where she took over leadership of the Institute of Virology, and later of all anti-infectives research. She founded AiCuris Anti-Infective Cures GmbH in 2006 as worked as its managing director. She has been chair of the AiCuris scientific advisory board since 2015. Helga Rübsamen-Schaeff has been a member of the Leopoldina since 2018. (bh)

they have in common is that success depends on excellent research. Even at Bayer and AiCuris we published in the top journals. One major difference, however, is that in industry the research has to be much more focused, because ultimately it is about bringing a drug to market. Time pressure is more intense, and you always have to work with a view to commercial success. Those working in academia can approach research questions in a more light-hearted way..

THE INTERVIEW WAS CONDUCTED BY
BENJAMIN HAERLE

■ DEUTSCHER ZUKUNFTSPREIS

Korean Academy visits the Leopoldina

On 13 and 14 December 2018, a high-ranking delegation from the Korean Academy of Science and Technology (KAST) visited the Leopoldina headquarters in Halle (Saale). The two academies have been linked since 2012 by a cooperation agreement that was officially extended in 2017. Joint events have been organised regularly in Korea and Germany since the collaboration began. The focus of these events has ranged from regenerative medicine and the latest developments in genetics to bioimaging techniques and their application, as well as assistance robotics and machine learning.

The Korean delegation led by Executive Vice President Prof. Dr. Ook Joon Yoo was welcomed at the Leopoldina by President Prof. Dr. Jörg Hacker ML as well as Presidium Members Prof. Dr. Wittig ML and Prof. Dr. Rösler ML. The aim of the talks was to evaluate the activities undertaken to date, and to develop a strategy for future collaboration.

All were in agreement that the societal relevance of projects should play a



Representatives of the Korean Academy and the Leopoldina held intensive discussions about the future focus of their collaboration..

Photo: Markus Scholz

central role. In view of the fact that both countries face similar social challenges, a wide range of topics were discussed, including artificial intelligence and genome editing.

The two academies will continue their collaboration on providing international,

science-based policy advice, and formats were discussed that go beyond the process established for the G20 summit. The delegates also held an open, constructive dialogue on the structure and working methods of academies and shared appropriate best practice examples. (rn)

Global Young Academy explores individual responsibility

Report lights on individual action and integration practice

People are increasingly aware of their direct and indirect role in global processes which they enable in one way or another and/or from which they benefit. People are now turning to opportunities for personal involvement to tackle problems such as climate change or structural poverty.

In the context of the worldwide refugee crisis, the Global Young Academy took a closer look at the trend of global individual responsibility and produced a report in December titled "Global individual responsibility: the role of the citizen in refugee integration". The report is directed towards individuals and policy makers and provides recommendations for individual action and civil society initiatives in relation to refugee integration.

People are encouraged to carry out seemingly small actions – such as offering verbal encouragement or a helpful gestu-

re – which can still have a symbolic and tangible impact. In an academic context, individuals can encourage support for refugees working in research at their institutions.

Political decision-makers are in turn called on, for example, to support flexible bottom-up solutions, to promote social institutions such as universities, schools, churches and community groups as well as to further the interaction and exchange between the local community and refugees.

The report came about as the result of an international symposium of scientists, practitioners and activists on different individual responsibility concepts and shed light on individual action and integration practices. (jp)

■ GLOBAL INDIVIDUAL RESPONSIBILITY

Reinforcements in the EASAC office at the European Union

EASAC, the European Academies' Science Advisory Council representing EU member states, Norway and Switzerland, has held an office in Brussels (Belgium) since 2010. The office functions as a base for contact between the Academies and the European Union institutions, particularly the Commission and Parliament. The EASAC Secretariat, based at the Leopoldina, works closely together with the Brussels office.

From the start of 2019, the Norwegian Academy of Science and Letters (DNVA) is providing one member of staff to support the EASAC office, financed by the Norwegian government. This will lend greater weight to the European Academies office as the voice of academia in Brussels. Most notably, it will help to establish more direct forms of communication for the science-based recommendations provided by the European Academies. (csd)

Carl Friedrich von Weizsäcker Prize



On 11 December 2018, Prof. Dr. Andreas Barner, President of the Donors' Association for the Promotion of Humanities and Sciences in Germany and Prof. Dr. Jörg Hacker ML, President of the Leopoldina, presented Prof. Dr. Jens Claus Brüning ML with the Carl Friedrich von Weizsäcker Prize. The hormone researcher was honoured for his work which has given us a better understanding of the causes of obesity and diabetes mellitus. His research has laid the foundations for potential treatments. In addition to receiving the prize, the winner is invited to give the traditional Leopoldina Christmas lecture in Halle (Saale).

Photo: Markus Scholz

Young Academy: Good work in science

At the invitation of the Young Academy, representatives of science and politics came together on 21 November 2018 to address the question of what constitutes "good work" in science. In the run-up to the event, the Young Academy created a short film in collaboration with the "Good Work" doctoral programme at the WZB Berlin Social Science Centre, in which the concept of "good work" is presented in the context of social history, social science and philosophy.

Literary scholar Dr. Michael Bies and social scientist Prof. Lena Hipp PhD introduced the film and moderated the subsequent discussion with Prof. Dr. Julia von Blumenthal, President of the European University Viadrina, Dr. Andreas Keller, Vice Chairman and Member of the Executive Board of the German Education and Science Workers' Union, Dr. Carina Sprungk, Coordinator of the WZB doctoral programme "Good Work" and Dr. Jürgen Ude, State Secretary in the Ministry for Economy, Science and Digitalisation in the federal state of Saxony-Anhalt.

The question of good work in science was answered with a particular view to young scientists and their employment relationships. Andreas Keller and Carina Sprungk criticised the fact that the majority of young researchers just have temporary contracts. Julia von Blumenthal and Jürgen Ude referred to the position of politics and academic administration, saying that temporary contracts are vital for ensuring a flexible reaction to the research and science economies. In addition, they continued, guaranteeing access to a tenure track model could give young researchers secure perspectives at an early stage in their academic careers.

(ar)

Study Centre becomes Leopoldina Centre for Science Studies

After five years, the Leopoldina Study Centre has been given a new name: the Leopoldina Centre for Science Studies. The new name strengthens the link between the task of combining the generation of scientific insights – the traditional task of every academy – using the Leopoldina Members' expertise with the tasks of the Leopoldina as the National Academy of Sciences: In the future, the focus should be on effective scientific work as well as offering advice for politicians and the public based on existing and new research.

"The Leopoldina Centre for Science Studies is the educational division for the temporal and theoretical backgrounds to our current problems," explains Prof. Dr. Alfons Labisch ML in an interview. As spokesperson of Centre's scientific advisory board, he has been instrumental in the

renaming. He points out that "the Study Centre ... is currently well endowed with external funding and coordinates third-party funds totalling several millions of euros." In total, a volume of more than four million euros has been and continues to be managed by the team at the Centre.

In addition, a fellowship programme has been initiated with support from the Friends of the Leopoldina Academy e.V., which gives researchers the opportunity to discuss important aspects of science and society and opens these debates up to the public. The topics addressed here, such as the question of how science manages to be perceived as reliable, are also going to be discussed at the Spring Conference. (rgo)

■ THE LEOPOLDINA SPRING CONFERENCE
(GERMAN ONLY)

Leopoldina supports postdocs

Scholarship for outstanding young scientists

Since it first started, the Leopoldina scholarship programme has taken a number of fellows to the East Coast of the USA where four postdocs are currently starting out on their scientific careers.

Marlene Bönstrup has just begun her postdoc at the Bethesda Campus of the National Institute of Neurological Disorders and Stroke (NINDS) in Maryland. Under Dr. Leonardo Cohen who works in the field of plasticity of the human brain, Marlene Bönstrup is investigating the off-line learning effect, a phenomenon associated with memory consolidation. She uses magnetoencephalography to measure the activity of neural networks in the brain during periods of learning and resting. Her results show that memory consolidation takes place within seconds, rather than hours or days as previously thought.

The doctor and prospective neurologist has already been given the prospect of follow-up financing from her host institute which will enable her to continue her clinical training in the field of neurological movement disorders in a third year at NINDS.

Ninety minutes by plane to the north, Dr. Mathias Scheurer's research activities at Harvard University focus on high-temperature superconductors (HTS), which are used in measuring technologies and could be applied in energy generation and transportation in the future. The theoretical physicist uses analytical and numerical methods from quantum field theory as well as statistical mechanics to offer new insights into the scientific understanding of high-temperature superconductors. This sees him making detailed comparisons of model-based prognoses with experimental observations.

In Prof. Dr. Subir Sachdev, he has found an experienced mentor for his research at the Department for Physics. Scheurer has already published his first results. Such visibility in the scientific community increases the chances that the Heilbronn-born researcher will be able to start his own working group in Germany following the postdoc scholarship.

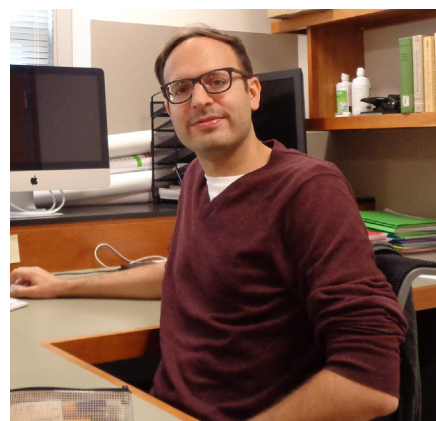
Not far away, Dr. Matthias Roos is also hard at work. Based at the Massachusetts

Institute of Technology (MIT), the physical chemist's research focuses on protein biophysics. Using nuclear magnetic resonance spectroscopy (MRS), he looks into the ion channels of the influenza B virus in order to determine their function and specific structure with greater precision. Magnetic fields of varying intensities offer detailed information about the molecule dynamics.

The aim is to use the knowledge gained about the virus to develop preventative approaches for tackling infection. Ideally, the proteins responsible for the reproduction of the virus could be targeted and their impact reduced, making it possible to intervene during the early stages of disease progression. Roos works under Prof. Dr. Mei Hong in a team of experienced specialists for nuclear magnetic resonance spectroscopy which have enabled for him to work with all the necessary large equipment and paved the way for his scientific future.

The chemist Dr. Klaus Speck, another recipient of the postdoc scholarship from the Leopoldina, is also based at the MIT. His research at the Department of Chemistry explores the chemical synthesis of chiral molecules. These molecules are chemically identical and mirror images of each other. However, the image and mirror image of many chiral substances demonstrate different reaction behaviour. If these substances are biologically active, the effect of one of the forms may be opposed to the effects of the other form.

The current challenge facing researchers like Speck is to synthesise as many molecules with a useful form as possible. This has practical relevance for pharmaceutical substances in particular. The desired results require the development of metal-organic catalysts. This is what Klaus Speck, who completed his doctoral studies at the Ludwig Maximilian University of Munich, is working on. Until mid-2019, he will be part of the MIT working group led by Prof. Dr. Stephen L. Buchwald, who has performed pioneering work in this field. For Klaus Speck as well, the residence in the USA serves as a springboard for his next steps in academia. (ac)



Thanks to the postdoc scholarship from the Leopoldina, Marlene Bönstrup, Klaus Speck, Matthias Roos and Mathias Scheurer (above to below) are pursuing their research goals at institutions on the East Coast of the USA. Photos: Marlene Bönstrup (1), Andreas Clausing (3)

People

New Class I members

Jürgen Gerhards ML, Berlin, Freie Universität Berlin, Institute of Sociology (Economics and Empirical Social Sciences Section)

Stefan Huster ML, Bochum, Ruhr University Bochum, Department of Law (Epistemology Section)

Antje Meyer ML, Nijmegen, Netherlands, Max Planck Institute for Psycholinguistics (Psychology and Cognitive Sciences Section)

Helmuth Trischler ML, Munich, Deutsches Museum, Research Institute (History of Science and Medicine Section)

Andreas Voßkuhle ML, Freiburg im Breisgau, Albert Ludwig University of Freiburg, Institute for Political Science and Philosophy of Law, Department 1: Political Science (Cultural Sciences Section)

Deceased members

■ **Albert Herz ML**
5 June 1921 – 9 November 2018 |
Munich, Germany
Physiology and Pharmacology/Toxicology

Albert Herz was Acting Director of the Department for Neuropharmacology at the Max Planck Institute for Chemistry from 1974 until 1980 when he was made Director, a post he held until his retirement in 1989. His scientific work focused on the neurobiology of opiates from the perspective of physiology, biochemistry and behavioural pharmacology. He made a significant contribution to determining the targets of these substances, identifying their receptors and clarifying the mechanisms involved in acute and chronic action. His research offered important insights into the molecular mechanisms underlying opiate addiction and pain management. In international recognition of his scientific achievements, he received the Nathan B. Eddy Memorial Award by the College on Problems of Drug Dependence

(CPDD) in 1988. The pharmacologist was also awarded an honorary doctorate from the University of Warsaw in 1990. He was made an honorary member of the Association of Neuropsychopharmacology and Pharmacopsychiatry in 1997 and the German Pain Society in 1999, and joined the Leopoldina in 1984.

■ **Amélie Mummendey ML**
19 June 1944 – 17 December 2018 |
Jena, Germany
Psychology and Cognitive Sciences

Amélie Mummendey was Professor of Social Psychology at the Friedrich Schiller University of Jena from 1997 to 2011. She made a significant contribution to cooperation and conflict between social groups. Earning her international acclaim, her work includes research on aggression and East-West integration, as well as on discrimination and tolerance. She founded the Graduate Academy of the University of Jena in 2007, which she headed as Scientific Director and Prorector until 2011. Among others, Mummendey was a member of the university council at the University of Jena and the University of Münster, a member of the Senate at the Leibniz Association as well as a reviewer and editor for prominent international journals such as the European Journal of Social Psychology. In honour of her service to research and science, she was awarded the Cross of the Order of Merit of the Federal Republic of Germany in 2015. Amélie Mummendey was elected a member of the Leopoldina in 2001.

■ **Richard Toellner ML**
2 January 1930 – 2 January 2019 |
Negenborn, Germany
History of Science and Medicine

Until his retirement in 1995, Richard Toellner was a Professor and Director of the Institute History and Theory of Medicine at the University of Münster (now the Institute of Ethics, History and Theory of Medicine). His research spectrum on the history of medical science ranges from antiquity to medicine under National Socialism. He earned wide acclaim with his scientific studies on the botanist and poet

Albrecht von Haller ML, and was also a respected expert in the field of medical ethics and theory. Together with Heinz Losse and Gustav Osterwald, Richard Toellner founded the Permanent Working Party of Research Ethics Committees in Germany in 1983, and was involved in the development of central ethical principles for medicine in Germany in his role as a board member until 1988. The member of numerous national and international expert societies advocated the recognition and equal status of the history of science in the canon of disciplines in humanities and natural sciences. Richard Toellner was elected a member of the Leopoldina in 1987.

■ **Karl-Armin Tröger ML**
30 November 1931 – 2 January
2019 | Freiberg, Germany
Earth Sciences

Karl-Armin Tröger was Professor of General Geology, Practical and Theoretical Stratigraphy from 1966 to 1976 and Professor of Historical and General Geology and Mapping from 1976 until 1991 at the Institute for Geology at the Bergakademie Freiberg. Together with scientists from the Moscow State University and the Academies of Science of Ukraine and the USSR, he researched stratigraphic problems in the Upper Cretaceous series in Eastern Europe and Western Asia on study visits and working stays between 1975 and 1976. His expert knowledge of Cretaceous stratigraphy offered valuable insights into the deposits from the Cretaceous period resulting from global marine transgressions and regressions. Tröger was made Professor of Dynamic and Historic Geology at the Bergakademie Freiberg (now the Technical University Bergakademie Freiberg) in 1992, a position he held until his retirement in 1996. In recognition of his commitment to the promotion of international scientific collaboration, he was awarded the Werner Heisenberg Medal by the Alexander von Humboldt Foundation in 1999. Karl-Armin Tröger became a member of the Leopoldina in 1973.



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Abbreviations:

ML = Member of the Leopoldina